RARE EARTH ELEMENTS IN SOME LITHIC AND MINERAL CLASTS OF POLYMICT UREILITES AND PETROGENETIC IMPLICATIONS. Yunbin Guan and Ghislaine Crozaz. Department of Earth and Planetary Sciences and McDonnell Center for the Space Sciences, Washington University, St. Louis, MO 63130.

Polymict ureilites, though dominated by a coarse-grained component similar in texture and composition to monomict ureilites, also contain a wide variety of small mineral and lithic clasts which have remarkably different features [1,2,3]. These components carry important petrogenetic information that is complementary to the one that can be extracted from ordinary monomict ureilites.

Based on a preliminary study[4], we extended our investigation of these clasts to five thin sections of the polymict ureilites EET83309, North Haig and EET87720. The major element concentrations were determined with a SEM-EDX spectrometer and the REE abundances of some mineral and lithic clasts were measured *in situ* with an ion microprobe.

One large (~1.7 mm) feldspathic melt clast in EET83309, 54 was reported in our previous study[4] to have an unfractionated REE pattern. Another similar but smaller (~300 mm) melt clast (E83-M2) was found in the same thin section; it also has a flat REE pattern (Fig. 1). Three feldspathic melt clasts (one highly devitrified), ~80 - 250 mm in size, with relative higher SiO_2 (66 - 73%) and Al_2O_3 (12 - 22%) contents, were observed in thin section EET83309, 35. One of them (E83N-G2) contains fine pyroxene laths (~1 mm in width) embedded in a feldspathic background (no olivine is present). Its REE pattern is characterized by a clear negative Eu anomaly and HREE enrichment. The other one (E83N-G1) displays the REE pattern typically observed in plagioclase. The devitrified clast E83N-P7 shows a slightly fractionated REE pattern with a small negative Eu anomaly. The REE patterns of these three clasts in EET83309, 35 suggest that they experienced more extensive fractionation than the two melt clasts in EET83309, 54.

A teardrop-shaped feldspathic clast (~500 mm) was also found in a thin section of North Haig; it contains clinopyroxene laths and grains larger (~10 mm) than in EET83309. Analyses of four spots in this clast provided two distinct REE patterns (Fig. 2). One is characteristic of plagioclase but the other one, with higher REE abundances and a small positive Eu anomaly, probably best represents the bulk properties of this clast. These are consistent with what is expected for basaltic components produced by igneous fractionation.

No individual feldspathic clast was found in two thin sections of EET87720.

Besides feldspathic clasts, two large (up to 1 mm in size) pyroxene mineral clasts were observed in North Haig. Both have the same texture which augite exsolution set inside enstatite. Their REE patterns are similar, but the REE abundances vary considerably from spot to spot within each clast (Fig. 3). Because it is difficult to analyze separately the two types of pyroxene, each measurement corresponds to a different proportion of augite. The highest abundance of measured REE should be close to those of the augite exsolution features. The REE patterns of these two clasts are most probably the result of igneous fractionation from a basaltic source. The large Eu anomalies in these two clasts likely reflect the highly reduced environments in which ureilites are believed to have formed.

The REE data on feldspathic clasts show that this component differs from sample to sample, even within the same polymict ureilite. Feldspathic clasts have previously been interpreted as either nebular components[5] or igneous fractionation products from monomict ureilites[6]. However, no similar nebular component has been found in other types of meteorites and, therefore, it is easier to conceive that these clasts are related to ureilites rather than formed in the nebula or introduced by basaltic impactors. Our data, as well as those from a previous study[4], suggest that

the feldspathic and some mineral clasts may represent the "missing" high Al, high Ca basaltic component associated with the formation of monomict ureilites. The diversity of REE abundances and patterns of these components must be the result of multiple fractionation processes that occurred after the partial melting of the ureilite parent body(ies).

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Fig. 1 REE Patterns of Feldspathic Clasts in EET83309

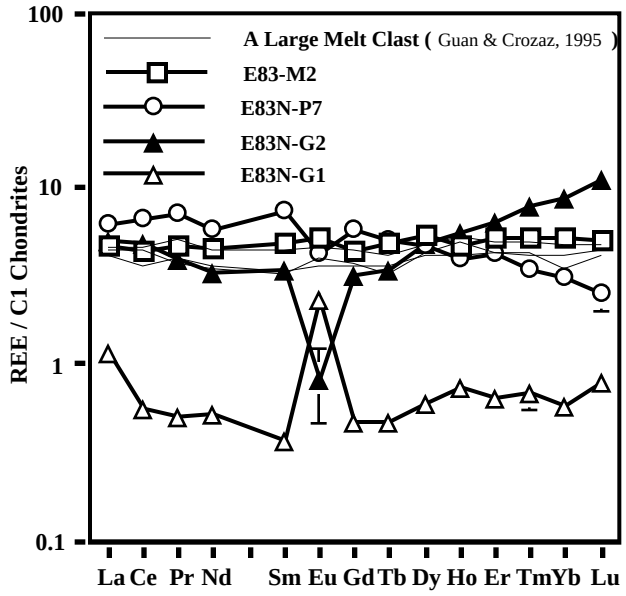

Fig. 2 REE Patterns of A Feldspathic Melt Clast in North Haig